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Subject: Review of Baseline Risk Assessment for the ACS Site, Griffith, Indiana

Dear Mr. Swale:

Following are Roy F. Weston, Inc.'s (WESTON) comments on the draft Baseline Risk Assessment (RA) for the ACS site.

General Comments

The ACS risk assessment was conducted, for the most part, in accordance with acceptable procedures for risk assessment projects. However, many of the assumptions used throughout the report, particularly in the exposure assessment, go well beyond the mandated "reasonable maximum exposure" (RME) approach. In many cases, an absolute worst-case approach is used. This can be useful in determining if any problems are likely at a site, but it is not useful if the risk assessment is intended to be used to determine appropriate cleanup levels.

This is one of the major criticisms of the document, along with the decision to break out every area in the site. The resulting confusion for the reader makes a detailed analysis extremely difficult. It also makes all the various exposure scenarios and assumptions even more questionable. For example, assuming that a trespasser will contact a single area on the site on a regular basis seems to be very unreasonable and very unlikely, especially considering the fact that there is no evidence of trespassing at the site. If cleanup standards are based on reducing this risk to a certain level, the mandated cleanup may be much more stringent than necessary to protect public health and environmental concerns.

Section 7.1.3.5.1.1, p. 14

"In reality, there are no apparent current exposures."

This comment should be deleted or expanded. While it may be true that exposure to site trespassers may be overestimated, site-specific information on trespassing is described as "not known." It seems inappropriate to conclude that no exposures are occurring based on the absence of information.

If, on the other hand, visual inspection of the site over time has indicated that there is little or no trespassing occurring at the site, this explanation should be expanded to describe the nature and frequency of the inspections.

Section 7.1.3.5.1.1.2, p. 17

"No air samples were taken in the field during the remedial investigation because of the difficulty in distinguishing air pollution sources at the site from anthropogenic background."

This is not supported with evidence in the risk assessment. Upwind and site samples could have been taken. Real-time VOC monitoring could have been performed to determine if any high levels of VOCs were being emitted. This could have confirmed the presence of VOCs or shown that this is not a significant source. This would have reduced the overall uncertainty of the risk assessment.

Section 7.1.3.5.1.1.4, p. 18

"Evidence of playing activity was not noted at these properties during the site visit. Nonetheless, to assess potential health risks associated with contaminated surface soils, contaminated exposure was quantified by assuming adolescents regularly play at the Kapica-Pazmey location."

This is a common assumption in the report. The risk assessment assumes contact is "regular" with no evidence to support the assumption. If this is a potential exposure, the contact should be assumed to be very intermittent, i.e., a lower exposure frequency. This comment should be considered applicable in most exposure situations.

Section 7.1.3.5.2.1.1, p. 21

"The likelihood of this (use of upper aquifer for drinking water) is unquestionably small. . . ."

This is a good example of the worst-case approach used in the assessment.

Section 7.1.3.5.2.1.2 , p. 22

Exposure to subsurface soils through excavation and residential construction are hypothesized. It is termed "highly unlikely."

This type of event should include some type of dilution of soil contaminants. It is extremely conservative to assume soils will be excavated and remain at the highest levels. In addition to mixing with uncontaminated soils, volatilization, and other processes will reduce contamination over time.

Section 7.1.3.6.2.1, p. 27

"A standard ingestion rate of 100 mg soil/day was used."

Recent U.S. EPA guidance recommend 100 mg/day for adults and 200 g/day for children. These values should be further modified based on the percent of the day a child spends at a particular location. It is an overestimate to assume that a child ingests all of a daily amount in a two-hour exposure period on a regular basis.

Section 6.1.3.6.2.2, p. 28

The assumptions used for dermal absorption are perhaps the most important in the exposure assessment. The 30 percent absorption for organics raises the contribution of risk for dermal exposure well above the risk for the incidental ingestion exposure route (and others) in many cases. This is not common in other risk assessments we have performed and reviewed. In fact, in a recent risk assessment, the U.S. EPA Region V discounted dermal absorption of PAHs as being unimportant compared to incidental ingestion in similar scenarios. This is a source of great uncertainty which should be evaluated very closely.

Metal absorption at 1 percent is also an overestimate according to some U.S. EPA sources.

Section 7.1.4, p. 31

"Although the chemicals have been divided into carcinogens or noncarcinogens, some chemicals are in both groups."

As it is written, this sentence is unclear. We assume that the authors wish to state that some chemicals have been evaluated as having the potential to cause both carcinogenic and noncarcinogenic effects.

Section 7.1.5.3.1.1, p. 37

Dermal absorption dominates risks to off-site residents. This is due to specific assumptions of dermal permeability. It is recommended that the contaminants which contribute most significantly, i.e., 2-butanone, benzene, etc., be evaluated in detail for their actual dermal permeability. Again, it is very unusual to have dermal exposure dominate risk estimates.

Section 7.1.5.3.1.2, p. 39

Same as above including PAHs, PCBs.

Section 7.1.5.3.2.1, p. 41

". . . contaminated groundwater in the upper aquifer was estimated to be $2.4 \times 10^{+3}$ (Table 7-38)."

The HI for the upper aquifer is $2.6 \times 10^{+3}$ as listed in Table 7-31. This value should be corrected here and in Summary Table 7-38.

Section 7.1.5.3.2.1, p. 42

"Other than 2-butanone, none of the other chemicals of potential concern have a HQ greater than 1."

This statement refers to contaminants in the upper aquifer. In addition to 2-butanone, acetone and 4-methyl-2-pentanone have HQ>1 (Table 7-31).

Section 7.1.5.3.2.1, p. 44

"Barium is the only other chemical (metal) of potential concern with a HI greater than 1 (1.1) (Table 7-37)."

This statement should be eliminated. Barium has an HI of 0.79 in Table 7-37.

Section 7.1.5.4, p. 47

"It is important to note that there are no apparent risks associated with site contamination currently."

This statement, similar to the one on page 14, should also be deleted or expanded. Table 7-38 indicates that there are apparent risks associated with current use of the site.

The uncertainty section is inadequate. In a risk assessment of this type, with so many assumptions that point toward a worst-case analysis, it is incumbent upon the risk assessor to provide a useful uncertainty analysis which puts the assumptions and the resultant risks in proper perspective. This needs to be greatly expanded.

Section 7.2, p. 50

General Comments

This ecological assessment is a qualitative assessment of the actual or potential ecological impacts of the site. If a qualitative ecological assessment is the objective of the work plan, this task has been completed.

One major problem found in the report was the inconsistency in measurement units (e.g., milligrams versus micrograms). Because of this, inappropriate conclusions are drawn in the report. In addition, the conceptual model describing potential ecological exposure pathways is incomplete and needs to be expanded. Conclusions cannot be drawn concerning the potential ecological impact of the site until sediment quality criteria are obtained, and other corrections are made.

Section 7.2, p. 50

Other manuals are available for guidance on ecological assessments, though not as recent as the Risk Assessment Guidance for Superfund - Volume II - Environmental Manual (U.S. EPA, 1989), including:

- U.S. EPA. 1986. Ecological Risk Assessment. Office of Pesticides Program. Washington, D.C. EPA-540/9-85-001.
- U.s. EPA. 1989. Ecological Assessment of Hazardous Waste Sites. A Field and Laboratory Reference. Environmental Research Laboratory. Corvallis, Oregon. EPA/600/3-89/013.
- Oak Ridge National Laboratory. 1986. User's Manual for Ecological Risk Assessment. Eds. L.W. Barnthouse and G.W. Suter II. Prepared for U.S. EPA, Interagency Agreement No. DW8993 0292-01-0.

Section 7.2.2, p. 52

"Terrestrial habitats are mostly limited to areas that have been used in the past as landfill or disposal Sites."

Should use lower case "s" for the word "Sites."

"Assessments of ecological resources based on future Site use will vary with the feasible alternatives and are addressed in a discussion of those alternatives."

This sentence is unclear; it would be more understandable as: "Assessments of risks to ecological resources based on future site use will vary with the feasibility study alternatives and will be addressed in a discussion of those alternatives."

Section 7.2.3, p. 53

"This area, of approximately 130 acres, includes primarily upland and wetland areas."

This sentence is unclear; it would be more understandable as: "This 130-acre area contains primarily upland and wetland habitats."

Section 7.2.3.3, p. 54

Are these wetlands recharge areas? Discharge areas? This information is needed to understand the importance of these wetland habitats, since true risk is based on the impairment of function.

"The northern wetland, designated wetland I. . . ."

The proper name Wetland I should be capitalized.

"Most of the PEMF and much of the PEMC areas are dense cattail (Typh sp.) Marshes."

"Typha sp. should be Typha spp.

Section 7.2.3.4, p. 55

". . . such as cottonwood, aspens (Populus tremula), and sumacs (Rhus typhina)."

To be consistent with the generic species term used throughout text, it may be more appropriate to use Populus spp. and Rhus spp. when referring to the genera.

Section 7.2.3.5, p. 55

"Habitat of Surround Areas"

This should read: "Habitat of Surrounding Areas."

Several questions arise when reading this section, including:

1) Can "the standing water bodies" in the areas surrounding the site be impacted by the site in any way, e.g., from contaminated groundwater?

2) Aren't the wetlands east of the ACS plant a "surrounding habitat"? They're not mentioned in this section.

3) What about Turkey Creek? Does the site have any potential impact on this surface water feature? Section 4.4.1 suggested that Turkey Creek may provide some drainage of the wetland.

Section 7.2.4, p. 56

"Tentatively identified compounds are not considered further due to lack of information regarding them."

This statement does not give strong support to the elimination of the TICS as contaminants of concern. Further description on the type of information lacking, e.g., toxicological, is needed. Also, listing the TICs in a table by media sampled would be more useful than a generic list of TICs. This helps the reader to draw the same conclusions as the author.

Section 7.2.5, p. 57.

LC_{50} values were less than 1,000 times greater than concentrations found in surface waters for these additional compounds:

Xylene (approximately 0.01 LC_{50} values - bluegill)
Phenol (approximately 0.01 LC_{50} values - bluegill, fathead minnow)
2,4-Dimethylphenol (approximately 0.01 LC_{50} values - bluegill)

In addition, LC_{50} values are given for the inorganic elements, but no comparison was made. Those inorganics below 1,000 times the LC_{50} for certain species were:

Arsenic (approximately 0.01 LC_{50} values - bluegill, fathead minnow)
Beryllium (approximately 0.01 LC_{50} values - bluegill)
Lead (approximately 0.01 LC_{50} values - fathead minnow)

These changes may be due to use of inconsistent units.

Section 7.2.7, p. 59

While toxicological information is not available for terrestrial species, a qualitative comparison between the LD_{50} values for rats can be used as a means of comparison. For example, the method described in Urban and Cook, 1986. (Hazard Evaluation Division Standard Evaluation Procedure: Ecological Risk Assessment. EPA 500 19-85-001.)

Section 7.2.7.1, p. 59

". . . seven metals exceeded the chronic, if not the acute, Ambient Water Quality Criteria."

Only three metals exceeded these criteria (chromium, iron, and lead). This change may be due to the inconsistent units presented in the tables.

Section 7.2.7.2, p. 59-60

No reference is provided for the equation used to calculate sediment quality criteria.

"Percent organic carbon (% OC) values are not available for the sampling locations at which these compounds were detected. Consequently, numeric SQC values cannot be developed at this time."

It would be useful at this time to make a reasonable estimate of the % OC value for the sediments at the site. This would allow estimated sediment quality criteria to be developed and examined prior to obtaining the actual site data.

Section 7.2.7.4, p. 61

Do contaminants from the site pose any actual or potential threats to the Hoosier State Prairie Nature Preserve? For example, are there any wetlands in the preserve that may be impacted from contaminated groundwater?

What about Turkey Creek? Does this creek have any significant areas that could be impacted?

Section 7.2.8, p. 62

"Although sediment samples were below background levels for soils for TAL metals, . . ."

Not all metals in the sediments were below the background soil levels. When compared to Table 5-1, these metals in the sediments were found at elevated levels:

Cadmium
Chromium
Copper
Lead
Mercury
Nickel
Selenium
Thallium

This difference may be due to the use of inconsistent units when comparing the results. Also, not all materials called "sediments" are sediments. For example, the soils in the wetlands are soils, not sediments.

Also, it may be useful to restate in the summary section that future ecological risks will be described in the feasibility study.

References, p. 63

When an author has more than one reference, the references should be placed in chronological order and given a letter if more than one reference was published in the same year (e.g., U.S. EPA, 1989a). This citation system must also be used consistently in the text.

References, p. 64

"U.S. United States Environmental Protection Agency. 1986. Superfund Public Health Evaluation Manual (SEAM)"

SPHEM should replace SEAM.

Tables 7-2 to 7-10

The type of mean value listed should be indicated (arithmetic, geometric).

Table 7-12 page 2 of 4

"Vinyl cyclohxane"

Should be vinyl cyclohexane.

Table 7-15, p. 4 of 4

The first two exposure routes on this page are duplicates. The second should probably refer to the upper aquifer.

Table 7-17

1,2,4-Trichlorophenol, listed in the semivolatiles, should be 1,2,4-trichlorobenzene. The oral RfD is 1.31E-3 mg/kg/day, and the inhalation RfD is 3E-3 mg/kg/day (HEAST, 4th quarter 1990).

The oral RfD for manganese is 1E-1 mg/kg/day, and the inhalation RfC is 4E-4 mg/cu.m. (IRIS, 12/01/90).

Additional Comments on Table 7-17

A tremendous amount of information has been organized into this table. Presenting the information in this compact form has eliminated identification of reference sources for each health criterion. Although there is a footnote indicating that all values were obtained from IRIS, HEAST, or approved by ECAO, there are instances when more explicit source referencing might prove useful to the risk manager.

For example, a value that plays an important role in the overall site risk is the dermal absorption coefficient for 2-butanone. As mentioned several times in the text, its dermal absorption coefficient is several orders of magnitude greater than most other contaminants. This increased dermal absorption leads directly to increased overall calculated site risk. Without identifying the source for this number, it is impossible to evaluate the uncertainty associated with it.

Table 7-18

The following chemicals should be listed as belonging to cancer risk group B2: 2,6-dinitrotoluene; 2,4-dinitrotoluene; benz(a)anthracene; chrysene; bis(2-ethylhexyl)phthalate; benzo(b)fluoranthene; benzo(k)fluoranthene; indeno(1,2,3-cd)pyrene; dibenz(a,h)anthracene; dieldrin; and lead. Butylbenzylphthalate and beta-BHC should be listed as belonging to cancer risk group C. Nickel should be listed as belonging to cancer risk group A for the inhalation exposure route.

Table 7-38

Under the cancer risks columns, dermal is misplaced in the column headings. It is placed above inhalation and should be above absorption.

Table 7-39

2,4-Dichlorophenol (2,4-DCP) is not included in the contaminant list, but 2,4-DCP is included in Table 7-40 and 7-41. Was this compound not found in the surface water, soil, or sediments?

"Berylluim" should be "Beryllium."

"Terralium" should be "Thallium."

The units for sediment and off-site shallow soil are incorrect. The column heading should read mg/kg not µg/kg.

Table 5-1 is referenced incorrectly in footnote (1); the reference should be to Table 5-3.

Table 7-40

Since toxicological data is not available for all contaminants, for consistency sake, it would be helpful to list the compound. This was done in Table 7-24 Also units for LC_{50} and LD_{50} are not the same as those used in Table 7-39 to describe the contaminant concentrations; for comparison sake, this would be helpful.

Table 7-42

Units for criteria differ from units given in data Table 7-39. Similar units make comparison easier.

Table 7-41

Headings are not lined up correctly.

This conceptual model is incomplete. Additional routes of contaminant pathways should be included as well as exposed populations. Exposure potential for biomagnification routes do not apply to those routes.

Figure 7-2

Location of site would be helpful on this map.

Also, the location of the off-site drum containment area is not shown on this map.

APPENDICES

Appendix T

The assumptions used in each exposure pathway are presented here. The key problem is that exposure which is described as unlikely in the text is treated as if it clearly occurs on a regular basis. The exposures should be looked at more realistically to comply with the RME approach. Listed below are some specific examples:

Table T-3

- EF - 182 days per year for an off-site resident

Table T-4 and T-5

- ET - child swims 2.6 hours per day
- EF - 2 days/week x 26 weeks/year

Table T-6

- CR - 100 mg/day
- FI - 50 percent
- EF - 2 days/week x 26 weeks/ year

Table T-7

- EF - 2 days/week x 26 weeks/year

Table T-8

- CR - .005 L/hr
- ET - 3 hours/day
- EF - 2 days/week x 26 weeks/year

Table T-9 and T-10

- ET - 3 hours/day
- EF - 2 days/week x 26 weeks/year

Table T-17

- CR - .005 L/hr
- ET - 3 hours/day
- EF - 2 days/week x 26 weeks/year

Table T-18

- ET - 3 hours/day
- EF - 2 days/week x 26 weeks/year

Table T-19

- FI - 50 percent
- EF - 2 days/week x 26 weeks/year

Table T-20

- EF - 2 days/week x 26 weeks/year

<u>Tables T-9 and T-18</u>
"RC - Chemical-specific (Table 7-17)"

"RC" should be "PC."

<u>Appendix U, page 2</u>

"The 95 percent upper confidence limit of the arithmetic mean (95% UCLM) is used to estimate exposure concentration."

This statement is misleading. While the arithmetic mean of log-transformed data has been calculated, this value, when exponentiated, represents the geometric mean of the data. It is the 95 percent UCL of the geometric mean that has been calculated and considered in determining the exposure point calculations. Use of the 95 percent UCL of the geometric mean assumes that the data are distributed log normally. Although this assumption may be a valid one, it should be stated explicitly in Appendix U.

<u>Appendix V</u>

The modeling techniques described in (Appendix V) represents a conservative approach to determine ambient air concentrations from area sources (i.e., landfills). The fashion in which the pollutant emission routes were first calculated and then allowed to disperse, follow acceptable techniques; however, there are some alternative procedures which could be used to more realistically estimate the ambient air concentrations.

Emission Rate

A limitation with the Shen/Farino emission rate estimation method described in Appendix V involves the assumption that the waste is completely saturated with each waste constituent. For waste streams which are not completely saturated, the Shen/Farino method will overestimate the emission rates. Though there are several other methods which can be used to estimate emissions, they all have limitations and the use of the Shen/Farino method, though conservative, is probably appropriate. It should be noted by the agency that the predicted concentrations are probably overestimated.

Modeling Technique

Although the use of a simple dispersion calculation to calculate ambient air concentrations is recommended by the Superfund Exposure Assessment Manual, (U.S. EPA, 1988), it is extremely conservative. Instead, a more sophisticated approach, involving the Industrial Source Complex Long-Term model (ISCLT) could be used. This would not require an extensive modeling effort. It would be a rather simple matter to use ISCLT and a five year wind direction frequency distribution for Chicago, Illinois, to provide a more realistic prediction of ambient air concentrations.

An additional concern with the modeling procedures involves the method described for combining concentrations from the four sites. It is suggested that due to problems summing the source contributions from the four sources, the maximum ambient air concentration is set equal to the maximum concentration generated by any of the sources. This could result in an underprediction of concentrations. Rather, it would be better to sum the maximum concentrations from each source and potentially overestimate the ambient air concentrations. An additional benefit to using the ISCLT model would be that the source contributions from each site could be totaled resulting in the most accurate estimate of ambient air concentrations.

Appendix W

The modeling techniques described in Appendix W also represent a conservative approach which will likely overestimate concentrations.

Emission Rate

In Appendix W, the PM10 emission rates are estimated using a method by Cowherd. Use of this method requires input of several meteorological parameters including a surface roughness coefficient. The surface roughness coefficient used to generate a PM10 emission rate represents a flat grassy surface with no buildings, hedges, or trees nearby and was selected from Figure 4-1 (U.S. EPA, 1985). This is very conservative and should be reviewed. Based on Site Meteorological Program Guidance for Regulatory Modeling Applications EPA-450/4-87-013 (U.S. EPA, 1987), a change in the surface roughness coefficient may be appropriate and would decrease the PM10 emission rate.

The Cowherd method for determining emission rates is specific for particulate matter. The use of it to generate emission rates for volatiles and some semivolatiles is not appropriate, although it could be used for semivolatiles which are likely to be attached to particulates.

Modeling Techniques

The method to determine the ambient air concentrations was based on suggestions by Cowherd. This method employs conservative estimates and applies to broad geographic areas. More accurate predictions of ambient air concentrations could be provided using the ISCLT model and a Chicago, Illinois wind direction frequency distribution, as described in the review of Appendix V. Again, the effort required to use the ISCLT model would be relatively minor.

Sources Reviewed for Comments for Appendices V and W

Rapid Assessment of Exposure to Particulate Emissions from Surface Contamination Sites. U.S. EPA 600/8-85/002. U.S. EPA, 1985.

On-Site Meteorological Program Guidance for Regulatory Modeling Applications. U.S. EPA 450/4-87-013. U.S. EPA, 1987.

Superfund Exposure Assessment Manual. U.S. EPA 540/1-88/001. U.S. EPA 1988.

Air/Superfund National Technical Guidance Study Series Volume II Interim Final. U.S. EPA 450/1-89-002. U.S. EPA, 1989.

Very truly yours,

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